National Type Evaluation Program (NTEP)
Combined Weighing & Belt Conveyor Scale Sector Meeting Agenda

August 17, 2021; 1:00 pm to 5:00 pm and August 18, 2021; 8:00 pm to 5:00 pm
Embassy Suites by Hilton, 535 Smithfield Street, Pittsburgh, PA

INTRODUCTION

The charge of the NTEP Weighing Sector is important in providing appropriate type evaluation criteria based on specifications, tolerances and technical requirements of NIST Handbook 44 Sections 1.10. General Code, 2.20 Scales, 2.22 Automatic Bulk Weighing Systems, and 2.24 Automatic Weighing Systems. The Sector's recommendations will be presented to the National Type Evaluation Program (NTEP) Committee each January for approval and inclusion in NCWM Publication 14 *Technical Policy, Checklists, and Test Procedures* for national type evaluation.

The Sector is also called upon occasionally for technical expertise in addressing difficult NIST Handbook 44 issues on the agenda of National Conference on Weights and Measures (NCWM) Specifications and Tolerances (S&T) Committee. Sector membership includes industry, NTEP laboratory representatives, technical advisors and the NTEP Administrator. Meetings are held annually, or as needed and are open to all NCWM members and other registered parties.

Suggested revisions are shown in **bold face print** by ~~**striking out**~~ information to be deleted and **underlining** information to be added. Requirements that are proposed to be nonretroactive are printed in ***bold faced italics***.

Table A
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Table B
Glossary of Acronyms and Terms

Acronym	Term	Acronym	Term
ABWS	Automatic Bulk Weighing Systems	NCWM	National Conference on Weights and Measures
AREMA	American Railway Engineering Maintenance-of-Way Association	NIST	National Institute of Standards and Technology
AWS	Automatic Weighing Systems	NTEP	National Type Evaluation Program
CC	Certificate of Conformance	OIML	International Organization of Legal Metrology
DES	Digital Electronic Scales	OWM	Office of Weights and Measures
HB 44	NIST Handbook 44	R	Recommendation
IZSM	Initial Zero-Setting Mechanism	SS	National Type Evaluation Program Software Sector
LMD	Liquid Measuring Device	S&T	Specifications and Tolerances Committee
MC	Measurement Canada	SMA	Scale Manufacturers Association
MRA	Mutual Recognition Agreement	WS	National Type Evaluation Program Weighing Sector

Details of All Items
(In order by Reference Key)

CARRY-OVER ITEMS

1. Recommended Changes to NCWM Publication 14 Based on Actions at the 2020 and 2021 NCWM Annual Meetings

Due to the need to have all voting results for the 2020 NCWM virtual Annual Meeting ratified, no action could be taken on the items at the 2020 Weighing Sector Meeting. Items which were adopted at the 2020 NCWM virtual Annual Meeting with a ratified vote at the 2021 NCWM Annual Meeting are listed below.

Source: 2020 NCWM Annual Meeting

1.1. UR.5 Coupled-in-Motion Railway Weighing Systems

UR.5. Coupled-in-Motion Railroad Weighing Systems

(a) A coupled-in-motion weighing system placed in service on or after January 1, 1991, should be tested in the manner in which it is operated, with the locomotive either pushing or pulling the cars at the designed speed and in the proper direction. The cars used in the test train should represent the range of gross weights that will be used during the normal operation of the weighing system. Except as provided in N.4.2. Weighing Systems Placed in Service Prior to January 1, 1991 and Used to Weigh Trains of Ten or More Cars and N.4.3.(a) Weighing Systems Placed in Service on or After January 1, 1991, and Used to Weigh Trains of Ten or More Cars, normal operating procedures should be simulated as nearly as practical. Approach conditions for a train length in each direction of the scale site are more critical for a weighing system used for individual car weights than for a unit-train-weights-only facility and should be considered prior to installation.

(b) For coupled-in-motion Point-based weighing systems used only for dynamic weighing, the user shall provide an alternate certified scale to be used as a reference scale. The weights and measures authority having jurisdiction over the weighing system shall determine if the reference scale provided is suitable in terms of size, capacity, minimum division, performance requirements, and the proximity to the weighing system under evaluation. The reference weight cars weighed on the reference scale may then be used for calibration and annual inspection by the jurisdiction with statutory authority for the system.
(Added 1990) (Amended 1992 and 20XX)

And add the following definition to NIST Handbook 44 Appendix D – Definitions:

point-based railroad weighing systems. – An In-Motion-Railroad Weighing System designed to weigh wheel(s) of a railway car when centered on the load sensor within a weighing zone typically of 2 inches or less. The weight of the wheels are added to obtain the total weight of the cars and train which are used for any transaction

Recommendation:

As this is a User Requirement dealing with the use of a reference scale during testing; there is no changes to Publication 14 needed.

Discussion/Conclusion:

1.2. S.1.2.2.2. Class I and II Scales Used in Direct Sale and S.1.2.2.2. Deviation of a "d" Resolution

~~**S.1.2.2.2. Class I and II Scales Used in Direct Sales. – When accuracy Class I and II scales are used in direct sale applications the value of the displayed division "d" shall be equal to the value of the verification scale interval "e."**~~
~~**[Nonretroactive as of January 1, 2020; to become retroactive as of January 1, 2023]**~~
~~**(Added 2017)**~~

~~**S.1.2.2.3. Deactivation of a "d" Resolution. – It shall not be possible to deactivate the "d" resolution on a Class I or II scale equipped with a value of "d" that differs from "e" if such action affects the scale's ability to round digital values to the nearest minimum unit that can be indicated or recorded as required by paragraph G-S.5.2.2. Digital Indication and Representation.**~~
~~**(Added 2018)**~~

Recommendation:

Changes to Publication 14 related to the requirement is S.1.2.2.3. were under discussion during the 2020 Weighing Sector Meeting, however; no final proposal was developed. With this specification being removed from the Handbook there is no further action required by the Sector.

Discussion/Conclusion:

1.3. N.5. Discrimination Test

N.1.5. Discrimination Test. – <u>Except for digital electronic scales designated Accuracy Class I or II in which the value of e = d and is less than 5 mg,</u> ~~A~~ <u>a</u> discrimination test shall be conducted on all automatic indicating scales with the weighing device in equilibrium at or near zero load and at or near maximum test load, and under controlled conditions in which environmental factors are reduced to the extent that they will not affect the results obtained. For scales equipped with an Automatic Zero-Tracking Mechanism (AZT), the discrimination test may be conducted at a range outside of the AZT range.
[Nonretroactive as of January 1, 1986] 29 (Added 1985) (Amended 2004 **and 20XX)**

Recommendation:

This item was intended to include current NTEP practice into the Handbook. Publication 14, Digital Electronic Scales, page DES-71, paragraph 44.2. currently has the following statement.

"Scales in which the value of e = d and is ≥ 5 mg.)"

No action is required.

Discussion/Conclusion:

<u>Source: 2021 NCWM Annual Meeting</u>

1.4. S.1.8.5. Recorded Representations, Point of Sale Systems

S.1.8.5. Recorded Representations, Point-of-Sale Systems. – The sales information recorded by cash registers when interfaced with a weighing element shall contain the following information for items weighed at the checkout stand[1] :

(a) the net weight;[1]

(b) the unit price; [1] [2]

(c) the total price; ~~and~~

(d) the product class or, in a system equipped with price look-up capability, the product name or code number~~.~~**; and**

(e) the tare weight.

[Non-retroactive as of January 1, 2025]

(Amended 2021)

[1]Weight values shall be **identified as tare and net, or gross if applicable. The unit of weight shall be** identified ~~by~~ **as** kilograms, kg, grams, g, ounces, oz, pounds, or lb. ~~**The "#" symbol is not acceptable.**~~

~~**[Nonretroactive as of January 1, 2006]**~~

[2]For devices interfaced with scales indicating in metric units, the unit price may be expressed in price per 100 grams.

(Amended 1995, and 2005, and 2021)

Recommendation:

The NTEP Administrator offers the following suggested changes to Publication 14, Electronic Cash registers Interfaced with Scales:

1. Page ECRS-15,

11.1.1. **The customer's receipt shall contain the products Tare and** Net weight values identified by the word "pound," "lb," "kilogram," "kg," "gram," "g," "ounces," "oz." ~~**The use of the symbol "#" for pound is not acceptable.**~~

Publication 14 currently does not have an example of a by-weight transaction. Do we need to develop one based on real life examples or is the change to paragraph 11.1.1. sufficient?

Discussion/Conclusion:

1.5. Sections Throughout the Code to Include Provisions for Commercial Single Draft Weigh-in Motion Vehicle Scales.

S.1. Design of Indicating and Recording Elements and of Recorded Representations.

…

S.1.14. Weigh-in-Motion (WIM) Vehicle Scales

S.1.14.1. Identification of a Fault. – Fault conditions shall be presented to the customer and the operator in a clear and unambiguous manner. No weight value shall be indicated or recorded when a fault condition is detected. The following fault conditions shall be identified if applicable:

(a) Vehicle speed was below the minimum or above the maximum speed as specified by the manufacturer.
(b) A change in vehicle speed greater than that specified by the manufacturer was detected.
(c) Vehicle direction of travel was not valid for the installation.
(d) The amount of time all vehicle axles were simultaneously on the scale was below the minimum Data Acquisition Time.
(e) Vehicle's path of travel was outside the lateral side edges of the load-receiving element.

S.1.14.2 Information to be Recorded. – In addition to the information that is normally recorded for vehicle scales, the following shall also be printed and/or stored electronically for each vehicle weighment if applicable:

(a) Scale identification if more than one lane at the site has the ability to weigh a vehicle in motion.
(b) Vehicle direction of travel if the Weigh-in-Motion Vehicle Scale is bi-directional.
(Added 20XX)

…

S.3. Design of Load-Receiving Element

…

S.3.4. Length of Weigh-In-Motion Vehicle Scales – The load-receiving element shall be of sufficient length to allow the weighment of any vehicle intended to be weighed on the scale in a single draft (i.e. all axles of the vehicle are on the load-receiving element simultaneously during the weighment). (Added 20XX)

…

S.6. Marking Requirements

Table S.6.3.a.
Marking Requirements

To Be Marked With ⇓	Weighing Equipment				
	Weighing, Load-Receiving, and Indicating Element in Same Housing or Covered on the Same CC[1]	Indicating Element not Permanently Attached to Weighing and Load-Receiving Element or Covered by a Separate CC	Weighing and Load-Receiving Element Not Permanently Attached to Indicating Element or Covered by a Separate CC	Load Cell with CC (11)	Other Equipment or Device (10)
Manufacturer's ID (1)	X	X	X	X	X
Model Designation and Prefix (1)	X	X	X	X	X
Serial Number and Prefix (2)	X	X	X	X	X (16)
Certificate of Conformance Number (CC) (23)	X	X	X	X	X (23)
Accuracy Class (17)	X	X (8)	X (19)	X	

Table S.6.3.a. Marking Requirements					
Nominal Capacity (3)(18)(20)	**X**	**X**	**X**		
Value of Scale Division, "d" (3)	**X**	**X**			
Value of "e" (4)	**X**	**X**			
Temperature Limits (5)	**X**	**X**	**X**	**X**	
Concentrated Load Capacity (CLC) (12)(20)(22)		**X**	**X (9)**		
Special Application (13)	**X**	**X**	**X**		
Maximum Number of Scale Divisions (n_{max}) (6)		**X (8)**	**X (19)**	**X**	
Minimum Verification Scale Division (e_{min})			**X (19)**		
"S" or "M" (7)				**X**	
Direction of Loading (15)				**X**	
Minimum Dead Load				**X**	
Maximum Capacity				**X**	
Minimum and Maximum Speed (25)			**X**		
Maximum Speed Change (26)			**X**		
Vehicle Direction Restriction (27)			**X**		
Safe Load Limit				**X**	
Load Cell Verification Interval (v_{min}) (21)				**X**	
Section Capacity and Prefix (14)(20)(22)(24)		**X**	**X**		

(Added 1990) (Amended 1992, 1999, 2000, 2001, 2002, 2004 and 20XX)

Table S.6.3.b.
Notes for Table S.6.3.a. Marking Requirements

25. Weigh-in-Motion Vehicle Scales must be marked with minimum and maximum vehicle speed limitations.
(Added 20XX)

26. Weigh-in-Motion Vehicle Scales must be marked with maximum vehicle speed change allowed during the weighment.
(Added 20XX)

27. Weigh-in-Motion Vehicle Scales must be marked as uni-directional if the travel direction is restricted.
(Added 20XX)

…

N.1. Test Procedures.

…

N.7. Weigh-in-Motion Vehicle Scale.

N.7.1. Reference Scale – A static scale as approved by the local jurisdiction shall be used to establish the weight of Reference Vehicles used in this procedure.

N.7.1.1. Dimension - The Reference Scale shall be of such dimension and spacing as to weigh Reference Vehicles in a single draft.

N.7.1.2. Location - The Reference Scale should be located near the Weigh-in-Motion Vehicle Scale to minimize the effect of vehicle fuel consumption. The Reference Scale and the Weigh-in-Motion Vehicle Scale may be the same scale.

N.7.1.3. Timing - The Reference Scale shall be tested immediately prior to using it to establish Reference Vehicle weights. A subsequent test of the Reference Scale may be performed immediately following the establishment of the Reference Vehicle weights to ensure its repeatability.

N.7.1.4. Qualification - The Reference Scale shall comply with the principles in the Fundamental Considerations paragraph 3.2. Tolerances for Standards.

N.7.2. Reference Vehicle – One or more Reference Vehicles shall be used to provide varying weight conditions for testing. Reference Vehicles should be representative of vehicles that are customarily weighed on the Weigh-in-Motion Vehicle Scale during normal operation. A motorized Field Standard Weight Cart with test weights and a driver may be used as an additional Reference Vehicle.

N.7.2.1. Weight Conditions - Reference Vehicle(s) shall be selected to provide at least a high and low weight condition. Different vehicle types may be used.

N.7.2.2. Load Position - Loads on the Reference Vehicle should be positioned equally side-to-side.

N.7.2.3. Static Weight - Reference Vehicle(s) shall be statically weighed on a Reference Scale as defined in N.7.1. immediately before being used to conduct the Weigh-in-Motion Vehicle Scale tests.

N.7.2.3.1. Rounding - Error weights may be added to the Reference Vehicle to increase its weight to a whole scale division to minimize rounding errors.

N.7.2.3.2. Re-weighing - Reference Vehicles may be re-weighed at the discretion of the testing authority.

N.7.3. Test speeds – The speed of the Reference Vehicle shall be maintained within the parameters as specified by the manufacturer during each test (see also S.1.14.1.a and S.1.14.1.b).

N.7.3.1 Range - Various speeds of the Reference Vehicle shall be used between the minimum and maximum operating speed specified for the Weigh-in-Motion Vehicle Scale. The minimum speed capability of the Reference Vehicle may be used as the minimum speed.

N.7.4. Static Tests for Weigh-in-Motion Vehicle Scale – The Weigh-in-Motion Vehicle Scale shall comply with applicable vehicle scale tests defined in N.1. when tested statically.

N.7.5 Dynamic Tests for Weigh-in-Motion Vehicle Scale – Test procedures shall simulate the normal intended use as closely as possible (i.e. test as used).

N.7.5.1. Vehicles - The tests shall be performed using the Reference Vehicle(s) defined in N.7.2.

N.7.5.2. Weighments - Each Reference Vehicle shall have a minimum of 5 weighments at the speeds as defined in N.7.3.

N.7.5.3. Vehicle Position - Reference Vehicle(s) must stay within the defined roadway along the load receiving element (see also S.1.14.1e).

N.7.5.4. Travel Directions - The tests shall be performed in both directions of travel unless travel direction is restricted by the marking.

N.7.5.5. Results - At the conclusion of the weigh-in-motion tests, there shall be a minimum of 10 total weight readings for the Reference Vehicle(s) for each applicable direction of travel. The tolerance for each weight reading shall be based on the gross vehicle weight and the applicable tolerance values for Class III L.

(Added 20XX)

Table 7a.
Typical Class or Type of Device for Weighing Applications

Class	Weighing Application or Scale Type
I	Precision laboratory weighing
II	Laboratory weighing, precious metals and gem weighing, grain test scales
III	All commercial weighing not otherwise specified, grain test scales, retail precious metals and semi-precious gem weighing, grain-hopper scales, animal scales, postal scales, vehicle on-board weighing systems with a capacity less than or equal to 30 000 lb, and scales used to determine laundry charges
III L	Vehicle scales (including weigh-in-motion vehicle scales), vehicle on-board weighing systems with a capacity greater than 30 000 lb, axle-load scales, livestock scales, railway track scales, crane scales, and hopper (other than grain hopper) scales
IIII	Wheel-load weighers and portable axle-load weighers used for highway weight enforcement
Note: A scale with a higher accuracy class than that specified as "typical" may be used.	

(Amended 1985, 1986, 1987, 1988, 1992, 1995, ~~and~~ 2012, and 20XX)

…

UR.3. User Requirements.

…

UR.3.13. Fault Indications for Weigh-In-Motion Vehicle Scales. – The fault conditions defined in S.1.14.1. shall be presented to the customer and the operator in a clear and unambiguous manner.
(Added 20XX)

…

Appendix D. Definitions

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data acquisition time (DAT). – The total time an object is completely on a load-receiving element while it is being weighed in motion. An object is completely on a load-receiving element from the time the trailing edge of an object to be weighed first moves onto the load-receiving element up to the time the leading edge of the object first moves off the load-receiving element. This time duration is affected by the length of the load-receiving element, speed of the object to be weighed, and the length of the object to be weighed. [2.20]
(Added 20XX)

…

reference vehicle. – A vehicle with an associated load, including the driver, that has been statically weighed for temporary use as a field standard, typically the time required to test one Weigh-in-Motion Vehicle Scale. [2.20]
(Added 20XX)

…

vehicle scale. – A scale **(including weigh-in-motion vehicle scales)** adapted to weighing highway, farm, or other large industrial vehicles (except railroad freight cars), loaded or unloaded. [2.20]
(Amended 20XX)

…

weigh-in-motion (WIM) vehicle scale. – A vehicle scale adapted to weighing vehicles as they travel across the scale without stopping. [2.20]
(Added 20XX)

Recommendation:

Mettler-Toledo LLC provide a draft of suggested additions to the Technical Policy and Checklist sections of Publication 14 that align with the adopted additions to the Handbook related to the Single Draft – Weigh-in-Motion Vehicle Scale.

This draft can be found in Attachment A of this meeting agenda.

Discussion/Conclusion:

2. Verifying the Performance Adequacy of a Reference Scale and Recommendations for Amendments to Publication 14 for Belt Conveyor Scales

Source:
NIST OWM's Legal Metrology Devices Group

Background:

During a 2016 meeting of the USNWG on BCS, the USNWG recognized that there has been a difference of opinion in the interpretation of tolerance application among regulatory officials, manufacturers, and users of belt-

conveyor scale type systems. The work group confirmed through their discussions that the tolerance prescribed in Handbook 44 Section 2.21. are being applied to the range of test run results by some evaluators as a "plus or minus" tolerance while others are taking a more conservative position and applying the tolerance as an absolute value. This lack of clarity in the Belt-Conveyor Scale Systems Code and the difference in interpretation of how the tolerance is to be applied was identified as a source of inconsistency in the regulation of this type of dynamic weighing systems. Since the USNWG recently amended the Belt-Conveyor Scale Systems Code to recognize systems that operate using multiple rates for the flow of material, this inconsistency was considered to be a significant issue that the work group should address.

The USNWG consulted past records of work group meetings, NTEP Sector meetings, and NCWM conference reports, along with other resources in attempts to determine the correct and intended application of the allowable variation between consecutive test runs when material tests are conducted. The USNWG was unable to arrive at any definitive conclusion on this issue through this research but they agreed it is necessary to amend the Belt-Conveyor Scale Systems Code to clearly identify the proper application of tolerances under specific sets of test conditions.

After lengthy discussion and much deliberation, the USNWG arrived at a consensus and agreed the existing tolerance should be applied as an absolute value when comparing test results performed under practically identical conditions (referring primarily to the flow rate of material). They also concluded that when comparing test results from test 1 runs performed under different conditions, the tolerance should be applied as a plus or minus value to the range of 2 test results.

The changes included in the attached proposal are intended to clarify how the prescribed tolerances are to be applied when comparing totalization operations during material tests on a "belt-conveyor scale system" or a "weigh-belt system." The recommended changes will specify the application of tolerances when material test runs are performed under practically identical conditions, and the proper application of tolerances when those test runs are performed under different conditions.

During deliberations on the issue of how tolerances are to be applied in a comparison of material test results, the USNWG acknowledged that advances in design and technology have resulted in belt-conveyor scale systems and weigh-belt systems capable of performing within more stringent tolerances. The work group also recognized that the international recommendation OIML (R50) incorporates different accuracy classes for these types of systems. It was also noted the Handbook 44 Scales Code (Section 2.20.) incorporates different accuracy classes for weighing devices regulated under that code. The members of the work group agreed there were benefits to introduce different accuracy classes for belt-conveyor scales and weigh-belt systems in Handbook 44 Section 2.21., believing that adding another accuracy class of dynamic weighing systems would provide more alternatives for determining the weight of various products in a wider array of commercial applications.

The additional changes in this proposal recommending the introduction of two different accuracy classes would retain the existing performance requirements (0.25 % relative to the weight of reference material used) and add a second accuracy class for devices/systems capable of complying with more stringent performance requirements (0.1 % relative to the weight of the reference material). In addition to introducing a new accuracy class with a smaller tolerance, other changes are included in this proposal to accommodate the addition of a second accuracy class. This proposal also recommends changes to account for differences in minimum scale division size, marking requirements, minimum test load size, and requirements pertaining to zero-tests (see attached document). These changes to the U.S. standards will harmonize more closely with international recommendation OIML R50 and bring the Belt-Conveyor Scale Systems Code in alignment with certain requirements in the Scales Code in Handbook 44. There may be opposing arguments from some that do not support allowing a "plus or minus" application of tolerances to the range of results from consecutive material test runs when those runs are performed under different flow rates.

In proportion to the number of these types of systems in commercial use, there are relatively few systems that are installed in a manner with the intent and/or ability to alter the flow rate of material.

Ensuring compliance with the provisions outlined in Section 3.2. in the Fundamental Considerations of Handbook 44 may prove challenging in some installations, depending upon the available equipment for weighing reference materials and conducting the test of the belt-conveyor scale system or weigh-belt system. The USNWG has received information however, from a device manufacturer (and member of the USNWG) that has demonstrated that these requirements are achievable.

At the 2019 NCWM Annual Meeting, the NCWM adopted amendments to the Belt-Conveyor Scales Systems (BCSS) Code, including adding a new Accuracy Class 0.1 and accompanying Note paragraph that requires the quantity of material used to conduct a material test on a Class 0.1 BCSS to be weighed on a reference scale to an accuracy within 0.035% (which equates to 0.35 lb/1,000 of test load). The tolerance to be applied to an Accuracy Class 0.1 BCSS is +/- 0.1% of the test load. OWM has some questions regarding the means of verifying the accuracy of some scales using procedures that will ensure when those scales are used to weigh material for a material test of a Class 0.1 BCSS, the actual mass of the material is within the 0.035% specified. Mr. John Barton (NIST OWM) and Mr. Rick Harshman (NIST OWM) will provide an overview of some test procedures being developed by OWM that can hopefully be used to confirm the adequacy of the reference scale (when used as a mass comparator) so that the scale can then be used to weigh reference material to within the 0.035% accuracy specified.

Although the NTEP Belt-Conveyor Scale Sector will be considering recommended changes to the Belt-Conveyor Scale and Weigh-Belt Systems portion of NCWM Publication 14 in the near future, it is thought members of the Weighing Sector might find this topic of interest because reference scales are used in other applications and may need to be tested similarly to determine their adequacy for use in weighing material. For example, reference scales are used to verify the performance of CNG Retail-Motor Fuel Dispensers.

Discussion/Conclusion: Belt Conveyor Scale Sector members in attendance at the October 29, 2019 meeting were notified that changes being recommended for NCWM Publication 14 were posted on the NCWM's website approximately two weeks prior to the meeting. Not all members at the Sector meeting had the opportunity to complete a full review of those recommended changes. Those Sector members agreed they would complete their review and provide any comments regarding edits or other changes by Friday, November 1, 2019. Those comments would be provided to NIST technical advisor who would then incorporate any necessary changes and forward the amended recommendations to the NTEP Administrator prior to the November 15th deadline. No significant changes were recommended by members attending the October 29, 2019 Sector meeting.

During the 2019 Weighing Sector Mr. John Barton (NIST OWM) provided an overview of some of the changes that were adopted at the 2019 NCWM Annual Meeting affecting the Belt-Conveyor Scales Systems (BCSS) Code. Most notably are new requirements intended to address a 0.1 Accuracy Class BCSS. As its accuracy class implies, the tolerance to be applied to a 0.1 Accuracy Class BCSS will be ± 0.1% of the test load, which is the level of accuracy some manufacturers of weigh-belts (a type of belt-conveyor scale system) are claiming their systems can meet. Measurement Canada has evaluated at least one of these systems and found its performance to be within the specified tolerance.

A new Notes paragraph being added to the BCSS Code in 2020 requires the quantity of material used to conduct a material test on a 0.1 Accuracy Class BSCS to be weighed on a reference scale to an accuracy of 0.35 %. This item was added to the Weighing Sector's 2019 agenda to solicit input from members on how best to establish the test loads needed to be able to test these systems in a field environment given the degree of accuracy required of the material. Scales performing to within this level of accuracy (0.035%) may not be available or the procedures typically used to verify the accuracy of some scale types may not be adequate to ensure that when product for a material test is weighed on those scales it will be within the 0.035% specified. For example, a section test on a vehicle scale using 25 000 lb of certified test weight and each section determined to be within 0.035% of the applied test load doesn't ensure axle-loads of vehicles positioned on these same sections weighing 35 000 lb will also be within 0.035% of their true value. Additionally, influences from environmental conditions may result in the need to postpone tests to a time when more favorable conditions exist. Measurement Canada's testing of one of these systems involved using a static railroad scale as a mass comparator and two test cars of known mass; one approximately equal to the weight of an empty railcar, and the other, approximately equal the weight of a railcar filled with material.

NTEP may soon begin receiving applications for type evaluations of these higher accuracy (0.1%) BCSSs. It too will need test procedures for verifying the adequacy of a reference scale used to weigh the material used for testing these higher accuracy systems. Current NCWM Publication 14 BCSS procedures for verifying the adequacy of a reference scale are intended for reference scales used to weigh product for a material test of BCSS

having an applicable tolerance of ± 0.25%. These current procedures are inadequate for use in verifying the adequacy of a reference scales used for weighing product for a material test of a BCSS system with a ±0.1% applicable tolerance.

The development of adequate test procedures for the reference scale will be a main focus of an upcoming meeting of the NTEP Belt-Conveyor Scale Sector. The meeting is planned for October 2019.

During the discussion of this item, Mr. Pascal Turgeon (Measurement Canada) and Mr. Zach Tripoulas (MD NTEP evaluator) offered to provide assistance in the development of the procedures.

2020 Weighing Sector Meeting:
During the 2020 WS Meeting, Mr. John Barton (NIST, OWM) updated the participants on the ongoing efforts of addressing the best approach to defining the needs and performance level of a reference scale needed to perform testing on a Class 0.1 Belt Conveyor Scale. Mr. Barton also mentioned his appreciation for the information and documentation sharing offered by Measurement Canada. Mr. Barton reported that he hopes to hold a meeting of the work group in the late September time frame to keep this item moving forward.

3. Discussion regarding Load Cell Capacities and v_{min} Values on NTEP Certificates of Conformance

Source:
Cardinal Scale Manufacturing Company

Background:
Mr. Eric Golden (Cardinal Scale Manufacturing Co.) introduced the idea of creating a method to allow the elimination of the table listed on the NTEP Certificate of Conformance (CC) that mentions specific technical specification such as capacity and v_{min}.

Discussion/Conclusion:
Mr. Golden pointed out that a capacity range is mentioned in the For: box of a CC, however; the table in the Standard Features and Options box lists specific capacities. In the event that a manufacturer wants to build a capacity that is within the capacity range in the For: box but not listed in the table, the manufacturer must submit an application to add this single capacity to the table.

Mr. Darrell Flocken (NTEP Administrator) mentioned that NTEP has no policy specifically stating the need for the table, however; the v_{min} value listed in the table, by device capacity, is needed to permit field officials to confirm the use of the proper load cell or load cell replacement when determining suitability of the load cell using the v_{min} Relationship Formula in Handbook 44, Scales Code, Paragraph S.5.4.

Mr. Golden explained that OIML has a method that allows the v_{min} value to be calculated using other specifications of the load cells performance. Using this method eliminates the need for the table listing each capacity and its associated v_{min} value.

Mr. Golden asked for volunteers to work with him to develop a proposal to remove the need for the table. The following individuals agreed to participate:

Scott Davidson	Mettler-Toledo, LLC
Darrell Flocken	NCWM
Andy Goddard	Marel
Jan Konijnenburg	Rice Lake Weighing Systems, Inc.
Rob Upright	VPG Transducers

Note: NTEP can support this work group by offering the use of the NCWM Zoom meeting scheduling capabilities.

4. Discussion on Use of Vehicle and Axle-Load Scales in Charging Service Fees

Source:
NIST-OWM

Background:
Mr. Rick Harshman (NIST, OWM) discussed a new proposal submitted to the Regional S&T Committees addressing the use of a vehicle and axle-load scales when charging a service fee.

Discussion/Conclusion:

Mr. Harshman explained that this is a developing item and was interested in any comments or feedback the meeting participants may have on the subject. Several members provided comments. Additional comments, or questions should be directed to Mr. Harshman.

NEW ITEMS

5. Correct Example of Marking Requirements

Source:
Ohio Department of Agriculture

Background:

Fix the example shown in the weighing Pub 14, DES paragraph 1.13.

We believe Handbook is clear that all digital values must agree with each other, we also believe that markings should agree with indications as well. Having a capacity in kg and a division size in g could be confusing to inspectors. It also raises the question, what is an appropriate display at zero? If the d is 0.001 kg, then zero must be displayed as 0.000 kg. If d is 1 g, then the zero display zero may be interpreted as a single 0 g. We do not feel that it is a good idea to mix units of measure.

Note: OIML accepts this marking requirement as well as Measurement Canada. It can also be argued that 0.001 kg is 1 g.

Recommendation:
Make the following changes/correction to Pub 14, DES paragraph 1.13.

If equipped with variable resolution, the scale shall be marked with the weight ranges and corresponding scale division sizes.

Example: 0 – 3 kg (6 lb) x ~~1 g~~ 0.001kg (0.002 lb)		0 – 6 lb x 0.002 lb
3 – 6 kg (15 lb) x ~~2 g~~ 0.002kg-(0.005 lb)	**OR**	6 – 15 lb x 0.005 lb
6 – 15 kg (33 lb) x ~~5 g~~ 0.005kg (0.01 lb)		15 – 33 lb x 0.01 lb

Discussion/Conclusion:

6. Automatic Weighing System, Permanence Test Requirements

Source:
NTEP Administrator on behalf of the NTEP Weighing Labs

Background:

The current requirements for the Permanence Test on an Automatic Weighing System (AWS) is documented in Publication 14, AWS, Test procedures for Influence Factors, Chapter 42. Repeated, in part, below for reference.

42. Permanence Test

A permanence test is conducted to determine the accuracy of the device in use over a period of time. In order to conduct a permanence test, the device will typically be tested at the manufacturer's location after the other portions of the type evaluation are complete. The necessity of having to run packages over the device for a specified period of time requires a continuous track to circulate packages. The manufacturer can set up a track system and within a few days run the equivalent of a million packages over the system. This should reveal any problems inherent in the system when it is retested following the permanence test.

Permanence Test Criteria

- Duration: Not less than 100 hours of continuous operation.
- Test Speed: At least 80% of maximum speed for the test load.
- Test Load: Between 75% and 100% of nominal capacity.

etc…

In the **Permanence Test Criteria** the duration of the test is to be not less than 100 hours of continuous operation. Several manufacturers of AWS instruments have voiced concerns at the requirement of "continuous operation" and have questioned what value continuous verses non-continuous has on the expected outcome of the test considering the potential added costs as well as concerns for safety. Initial research into the reason for the test to be continuous has not turned up any supporting documentation.

Recommendation:

The proposal is to remove the word "continuous" from the duration requirement of the test criteria.

42. Permanence Test

A permanence test is conducted to determine the accuracy of the device in use over a period of time. In order to conduct a permanence test, the device will typically be tested at the manufacturer's location after the other portions of the type evaluation are complete. The necessity of having to run packages over the device for a specified period of time requires a continuous track to circulate packages. The manufacturer can set up a track system and within a few days run the equivalent of a million packages over the system. This should reveal any problems inherent in the system when it is retested following the permanence test.

Permanence Test Criteria

- Duration: Not less than 100 hours of ~~**continuous**~~ operation.

Discussion/Conclusion:

7. Listing Manual Weight Entry on a Certificate of Conformance

Source:
NTEP Administrator on behalf of the NTEP Weighing Labs

Background:
NTEP has evaluated several Price Computing Scales and Point-Of-Sale software packages that had the ability to enter a manual weight which was then used for creating a charge for the commodity. These devices were issued non-conformances as these instruments are traditionally used in point-of-sales application and UR.3.9.(a) prohibits the use of manual weight entries in a point-of-sale system interfaced with a scale for any transaction other than giving credit for a weighed item. (Note, in all cases the manufacturer corrected the non-conformance by either removing the feature or limiting its operation for a credit only transaction.)

This item~~s~~ identifies several areas of concern:

1. NTEP's focus is on an instrument ability to operate to the specifications and tolerances mentioned in Handbook 44, however: NTEP cannot evaluate instrument for conformance to the defined User Requirements in the Handbook. While NTEP stands behind its actions on the above examples, NTEP also realizes ~~that~~ that there are instruments that have the ability to operate in multiple applications, including applications that permit a manual weight entry. For this reason, NTEP evaluation of this feature should be limited to the specification as stated is the scales Code, Specification S.1.12. Manual Weight Entries. Repeated below for reference.

   > ***S.1.12. Manual Weight Entries.*** *– A device when being used for direct sale shall accept an entry of a manual gross or net weight value only when the scale gross or net* weight indication is at zero. Recorded manual weight entries, except those on labels generated for packages of standard weights, shall identify the weight value as a manual weight entry by one of the following terms: "Manual Weight," "Manual Wt," or "MAN WT." The use of a symbol to identify multiple manual weight entries on a single document is permitted, provided that the symbol is defined on the same page on which the manual weight entries appear and the definition of the symbol is automatically printed by the recording element as part of the document.*

   During the 2021 NTEP Weighing Laboratory Meeting, the evaluators agreed that when evaluating a manual weight entry feature on a Point-of-Sale system or Point-of-Sale software package the user requirement will be applied and the listing of a manual weight entry feature on the NTEP Certificate of Conformance will include a statement identifying that this feature is only for the use of issuing a credit on a weighed item. On instruments that have multiple application functionally, the statement will identify only the limitation when the instrument is using its POS application functionally. Instrument~~s~~ that do not have POS functionally but do have the feature for other accepted uses, as defined in UR.3.9. Use of Manual Weight Entries, no limiting use statement will be included on the certificate.

2. Should S.1.1.3 of the Scale Code be expanded to include the limitations defined in the User Requirement or include a reference to the User Requirement? Upon informing the manufacturer of the non-conformance, the first question asked was "Show me the specification in the handbook." NTEP can only point to the User Requirement and take the position that the current functionality is not acceptable under the requirement that the instrument can be designed in such a manner that it can be used to facility fraud. An acceptable approach, however; this approach would tend to support that the feature should be removed, but a User Requirement permits it function in a limited situation.

Recommendation:

I offer no actual proposal to address this situation, however: I do ask that the members of the Weighing Sector consider the information provided and develop a consensus as to whether the current information in S.1.1. and UR.3.9. is sufficient, or if an effort should be made to develop a proposal to modify the information in Handbook 44?

Discussion/Conclusion:

8. Discrepancy in Publication 14, Digital Electronic Scales, Category 3 requirements

Source:
Ohio Department of Agriculture

Background:
On page DES 33, line 10.20 reads " 10.20. The system is designed to attach a printer which can print the contents of the audit trail."

Then under Appendix B, page DES 152 line 4 under event loggers states:

" 4. A hard-copy printout of the contents of the event logger shall be available upon demand from the device or an associated device on the site of the device installation. The display or printing of the event logger contents shall exclude other non-metrological information, such as transaction data, operator inventory records, shift totals, etc."

Note: Hb 44 G-S.8.2 has wording similar to des 152 in pub 14.

Recommendation:

Change line 10.20 to read:

The system is designed to **provide a hard copy printout** ~~**attach a printer which can print**~~ **of** the contents of the audit trail **on demand from the device or an associated device on the site of the device installation**."

Discussion/Conclusion:

9. Change in Meeting Documentation Development Process

Source:

NTEP Administrator

Background:

The responsibility for the development of the meeting agenda and summary documents has changed. Beginning with the 2021 meeting a member of the Weighing Sector, with the help of NTEP personnel, will assume this responsibility. This change is based on direction from the NTEP Committee and the NCWM Board of Directors and aligns the responsibility with the current action of other Sectors, Work Groups, and Task Groups.

During the transition period from now until the 2021 meeting, the NTEP Administrator will create the meeting agenda and complete a meeting summary report for distribution to the Sector Members, at a later date.

In addition to the assignment of the individual or individuals responsible for these documents, I would encourage the Sector to develop a timeline document to assist the individual in the ability to develop a meeting agenda in a timely manner and with the least impact to their current responsibilities. Due to meeting time constraints, I would offer my assistance to develop this timeline document offline, with the distribution, review, and acceptance of the document to occur within six months from the adjournment of this meeting. I few items to be addressed in this timeline document would be:

1. A deadline for the submittal of new proposals, and reports from subgroups with specific assigned tasks,
2. A deadline for the distribution of the agenda and summary documents.

I would suggest that the timeline document be placed on the Weighing Sector home page on the NCWM Web Site.

Discussion/Conclusion:

As reported at the 2020 NCWM Interim in Riverside, CA, NIST and the NCWM Board of Directors agreed to a change in the responsibilities for the development of the meeting agenda and the writing of the meeting summary. This change removes these tasks from the NIST Technical Advisor and moves them to the responsibility of the individual Sectors. To move forward with this change, the Sector Members are tasked with creating a position assigned to an individual who will be responsible for creating these documents. I need to point out that the NIST and NTEP Technical Advisors will support the individual in these tasks. As this may be the first you heard of this change, the NTEP Technical Advisor agreed to write the Meeting Summary for the 2020 meeting.

During the discussion, Mr. Loren Minnich (Kansas) agreed to accept this task. Ms. Tina Butcher (NIST, OWM) and Mr. Darrell Flocken (NTEP Administrator) provided comments on how this is a shared task at the National S&T Committee for the writing of their meeting summary.

Mr. Flocken mentioned that he is planning to develop a sector guideline document including possible work instructions and timelines that will be usable by all sectors.

Mr. Rob Upright (Sector Chair) thanked Mr. Minnich for agreeing to fill this position beginning with the 2021 WS meeting.

10. Next Meeting

The Weighing Sector Meeting is typically held the second or third week of August. The members are asked to provide information on the dates and location for the 2022 meeting.

11. Meeting Attendees

The following individuals participated in the 2020 Weighing Sector meeting.

Weighing Sector Members:

Belt Conveyor Scale Sector Members:

Other Participants: